

STUDIES OF THE STRUCTURE AND ULTRASTRUCTURE OF THE  
GLOCHIDIAL STAGE OF *ACTINONAIAS LIGAMENTINA*  
LAMARCK (BIVALVIA: UNIONIDAE)

KAREN HEFFELFINGER OLSON  
Ohio State University, Columbus, Ohio

Since no previous electron microscope studies are known for the glochidium, it is hoped that this study will at least provide a starting point for further investigations.

The shell of the glochidium was found to be two layers thick with evidence suggesting that it is deposited intermittently, since growth rings were noted on the surface of the shell. The flange was as Arey (1932) depicted it, an intumed shelf with conical teeth over much of the surface. No additional shell material is apparently being secreted at this time.

The presence of microvilli, micropinocytotic and microphagocytotic vesicles over much of the apical cell surfaces of the inner mantle supports the concept of a digestive function for this organ. A variety of cell attachments were represented by the zonula occludens, zonula adhaerens, septate desmosomes, and interdigitations of cell surfaces. Five cell types were identified for the inner mantle, each named for an obvious feature which it displayed. These types are: the granule-containing cells, flattened squamous epithelial cells, ribosome-rich cells, non-ciliated papillae, and ciliated papillae.

The four pairs of papillae, formerly designated in the literature as hairs or bristles, were identified as true cilia with a 9 plus 2 fibril arrangement; thus the name ciliated papillae is here assigned to these structures. No movement of these cilia was observed in living glochidia but a mechanical force applied to them elicited stimulation which was apparently conducted to the adductor muscle causing it to contract. On the basis of the mode of stimulation, the unicellular core of the sensory papillae was classified as a mechanoreceptor.

The very flattened outer mantle lies in close proximity to the interior of the shell. It appears to have a function of providing an anchorage and attachment layer for the inner mantle and the adductor muscle.

Evidence indicates that the adductor muscle of the glochidium is neither smooth nor striated. Nor does it exactly fit into any categories presently used to describe muscle types. Thick and thin filaments are found with the thick ones arranged in a hexagonal pattern to one another. Some properties such as sustained contraction, size of the thick filaments, and the presence of cross-striations of the thick filaments indicated that paramyosin could be a component of this muscle.

The rudimentary sac and lateral pits were identified and examined at the light microscope level. It is believed from these observations that the rudimentary sac opens posteriorly into the mantle cavity in at least some glochidia. Other observations also suggested that this structure could be a rudimentary gut. The lateral pits are not believed to be ciliated as was previously noted in the literature, but perhaps this observation would be valid for other species of glochidia. Further examination must be made of these structures, using the electron microscope, to obtain more information as to the form and function of the rudimentary sac and lateral pits.